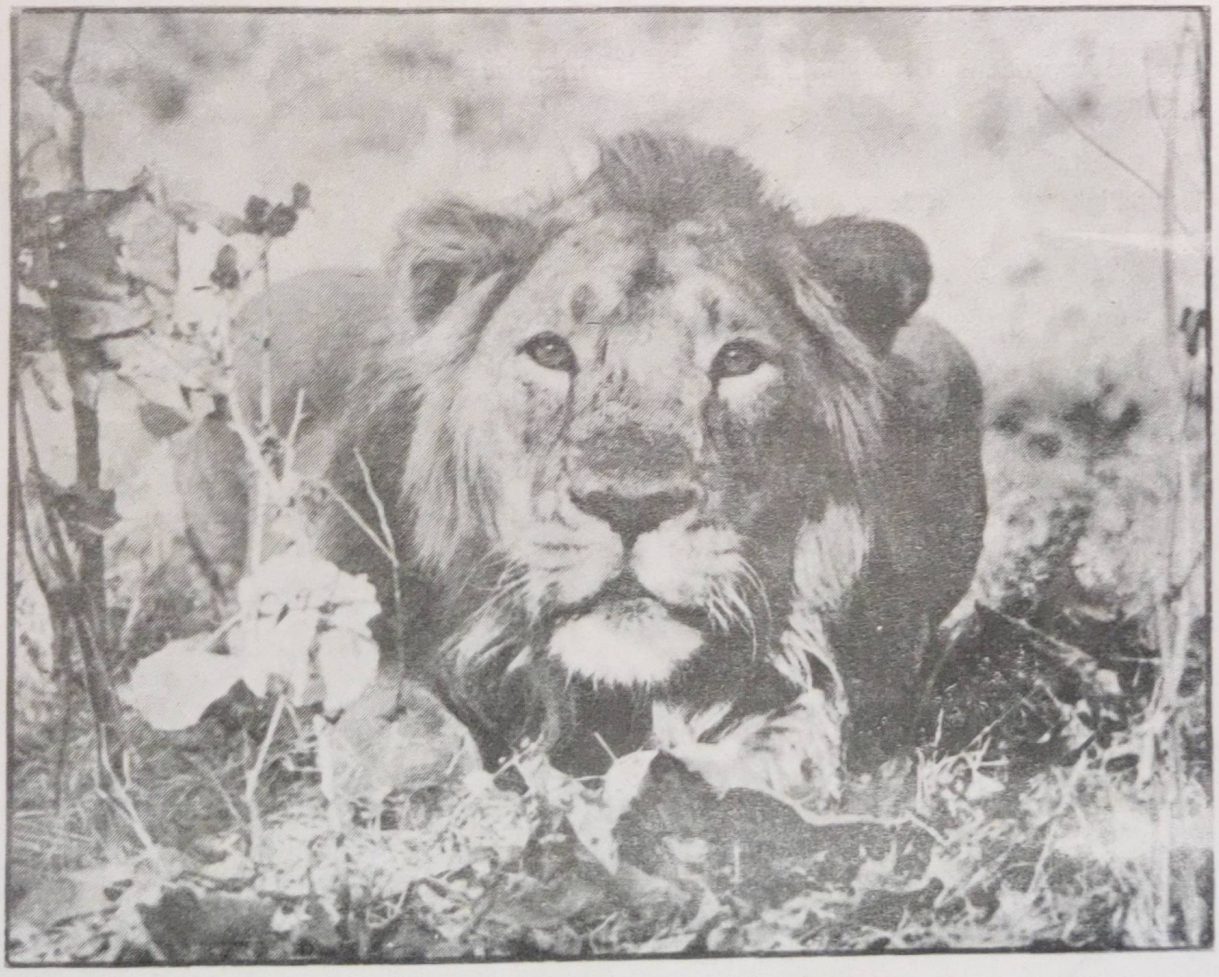
CHEETAL

JOURNAL OF

The Wildlife Preservation Society of India

Vol. 28 October, 1987 No. 4

Indian Lion
Photo by — Hanumantha Rao



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Journal of the Wildlife Preservation Society of India

Vol. XXVIII | Oct. 1987, Dehra Dun | No. 4

Some More on Tiger Tracks

By

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Introduction

It is an established fact that individual tigers can be identified in field by characteristics of their pugmarks or tracks. This has been the basis of censusing tigers in India (Choudhary 1970, 1972). Improvements in the technique of recording and converting field evidence into verifiable records have been suggested by Panwar (1980). Jayarajan (1983) has documented a review of the census technique and has classified tracks into separate 'form' categories to facilitate initial sorting of pugmark traces. Hunters and trackers of yester year with legendary skills of tracking individual tigers had relied on pugmark features (Booth 1986). The skills continue to be nourished today by wildlife managers in field. Besides the pugmark itself other parameters are in use as corraborative evidence for confirming tiger identities viz. the stride and the straddle (Choudhary 1971, Bang and Dahlstrom 1974). The normal gait of the tiger can be added to ease the search for tiger identities, especially useful where a large number of pugmark traces are required to be analysed for the purpose. Shaikh and Sawarkar (1979) have made use of the normal gait as additive evidence. The usefulness is discussed further.

Track Sequence and Interpretation

A track sequence essentially refers to the gait of an animal. The gait or the pattern of animal locomotion has been under study for well over a century (Stillman 1882, Marey 1895, Muybridge 1899). Gaits have been variously recognised and analysed for domestic and wild animals, the principle being the same—the foot fall formula or sequence (Sukhanov

1968, Bullock 1971). For the gait to serve its purpose as an additive evidence for establishing a tiger's identity it is essential to interpret gaits correctly. The gait category of relevance in the present context is the 'normal gait' or the pattern of pugmark ssquence as a result of a 'normal' walk, the speed of walk which is naturally comfortable to an individual. The questions are (i) for a normal gait is there a uniform pattern of pugmark sequence for all individuals ? (ii) how to recognise such a sequence ?

Choudhary (1972) states that during a tiger's normal walk the hind paw falls exactly on the spot vacated by the front paw of the same side resulting in complete superimposition. The front paw impression is completely obliterated and consequently pugmarks of only the hind feet are obtained in a trail. Champion (1930) observed that in case of the majority of tigers the hind foot impression is seen to overshoot the front foot impression on any given side. His photographs indicate such a case. The sequence showing only the hind feet pugmarks (the front feet impressions completely superimposed) was attributed by him to stiffness in legs due to old age which hampers the normal leg movement. Brander (1930) agreed with Champion but reasoned that the case of complete superimposition of front feet tracks by the hind feet indicated 'caution'. This inference however relates to change in gait or a departure from the normal walk. Harish Chandra (1969) states that in a 'relaxed' walk the hind feet impressions are seen to be leading the impressions of the fore feet, at the same time it is stated that 'one line tracks' appear to be predominant among all sequence patterns. A one line track is obtained when the hind paw completely covers the print of the fore paw. Harish Chandra also observed that complete superimposition of the front paw impressions is not necessarily the constant feature in a one line track. Here again it amounts to a change in gait. Bang and Dahlstrom (1974) state that in a normal walk the footprint sequence may exhibit variable patterns—fore foot impression either completely or partially superimposed by that of the hind foot is seen for different animals. McDougal (1977) in his book, The Face of the Tiger has presented pugmark sequence photograph for four tigers—one male and three females. Pugmark sequence of one tiger indicates partial superimposition of the fore paw prints and in the remaining three there is no superimposition of the fore paw prints at all with the hind paw prints leading in all cases. Sankhala (1978) states that sequence patterns may vary but the most common pattern of all was no superimposition of fore foot prints. Shaikh and Sawarkar (1979) have cited examples of sequence patterns ranging from the complete superimposition of the front paw prints, through intermediate stages of partial superimposition to no superimposition at all. Panwar (1980) observed that in a normal walk, the impression of the front paw may be partially or completely superimposed by the hind paw impression. The foregoing indicates clearly that there is a variation of print sequence among individual tigers for the same gait.

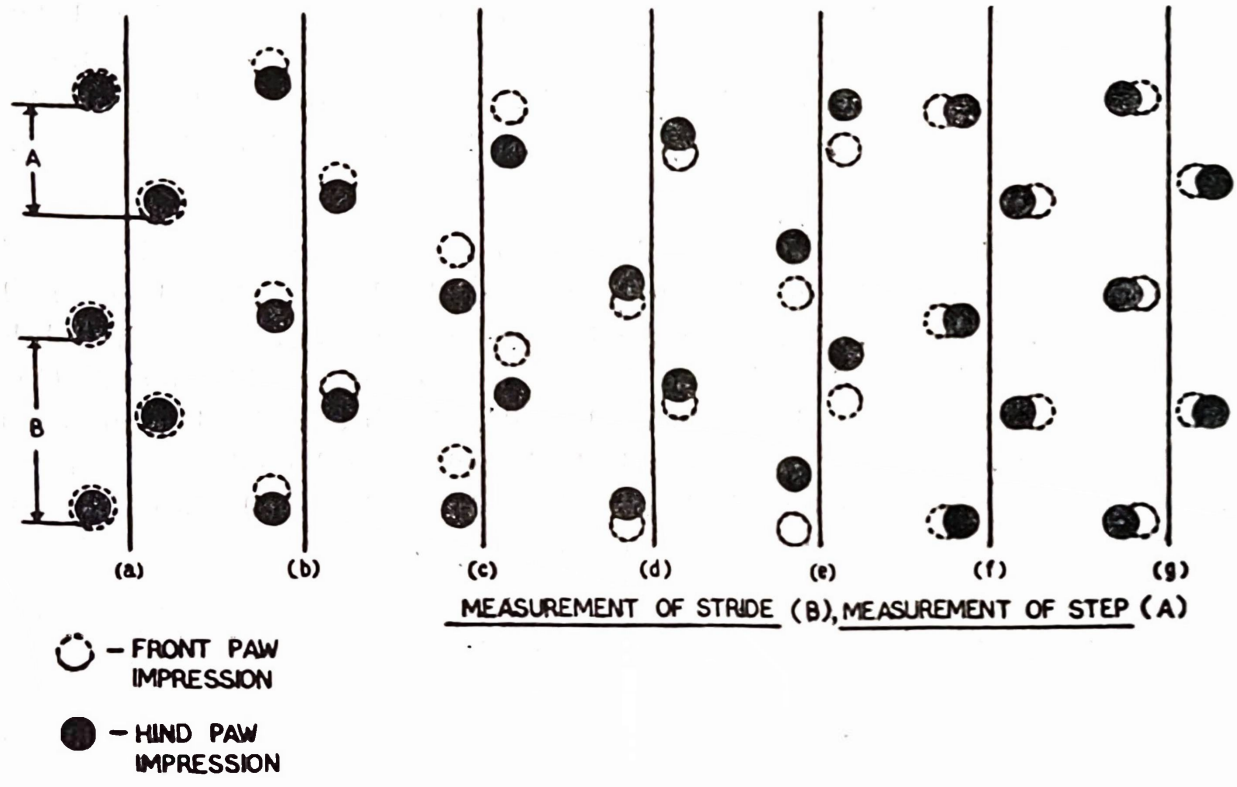
Data collected on the pumark sequence patterns relating to the normal walk of the tiger from 26 wildlife areas : 23 Protected Areas and three Forest Divisions, is presented in Table 1. In all, tracks of 142 tigers are examined. It will be seen that the normal gait of the tiger may have variable sequence patterns of foot prints among different tigers. Taken as a category, the 'single track' pattern is the most common (34.6%), followed by the sequence in which the hind paw while leading the fore foot impression superimposes it partially (24.6%) and overshoots is completely (19.7%). Sequence in which the hind paw undershoots the front partially or completely and cases of lateral superimposition are among the least common.

The normal gait sequence for an individual tiger cannot be established by any given small section of a pugmark trail. For this purpose the trail should be followed over as long a stretch as possible. The most commonly occurring sequence pattern in the trail belongs to the normal gait. This is based on the fact that the most common gait employed by the tiger during his perambulations is the 'normal walk'. Each examination ensures that variation due to change in gait is recognised and eliminated. This base line pattern is also necessary to interpret gaits for an individual tiger. The six fundamental sequence patterns relating to the normal walk are depicted in Figure 1.

The 'stride' is a measurement related to the pugmark sequence. It is included in the tiger's 'identity kit' by Choudhary (1971, 1972). As used in the census, it is the distance between the successive left and the right hind paw impressions, measured between heel to heel or toe to toe vertically or parallel to the direction of walk. This is easily done by drawing tangents at 90 degree to the direction of walk from the outermost point of the heel or toe as the case may be and measuring the distance between the two on a line at 90 degree to the tangents (Fig. 1, measurement (a)A). Definition of the term 'stride' has caused some confusion. The stride is described by Sukhanov (1968) as one full action cycle of a limb and that in each cycle the two extremities describe a double step. A step is described as a distance between the sequence of prints of two feet (The fore or the hind pair). Here the step is what Choudhary described as the stride. Bullock (1971) defines the stride as one complete action of all four feet and the step as the complete movement of one foot. As described, the step is equivalent to what Sukhanov describes as the stride. Bang and Dahlstrom (1974) define the stride as the distance between two successive tracks of the same foot, the same as Sukhanov (Figure 1, measurement (a) B). The definitions need not create any practical problems. The measurement (a)B is just the twice of measurement (a)A but to maintain uniformity the 'stride' described by Choudhary must continue to be used. It is also the more practical of the two measurements since the two successive prints, of the left and the right side can be quickly located especially on difficult substrates which make the task of tracking a trail a problem.

FIGURE -1

FUNDAMENTAL LOCOMOTARY PATTERNS OF WALK IN A TIGER [(a) to (g)]



Application of the Track Sequence

When properly observed and recorded the track sequence pertaining to the normal walk of an individual tiger serves very usefully in sorting the pugmark traces from a large collection such as during a census operation on account of the range of variation shown with respect to individual tigers. The degree of variation can be enhanced by recording measurements of the extent of overshooting or undershooting or lateral overlaps. It must be appreciated that the track sequence *per se* is not the last word on an identity. It cannot be so finely calibrated. It must remain as an aid to sorting traces initially and help resolve 'ties' in the final stage of analysis.

Sorting the pugmark traces is essential for the object of narrowing down the search for individual tiger identities. It is necessarily required to be done in stages. The sequence as per Flow Chart at Fig. 2 is recommended for the purpose.

Table 1

Pugmark sequence patterns exhibited by tigers during normal walk

Sl. No.	Area	Tracks recorded for No. of tigers	Tracks complete super-imposition	Partial superimposition No. of tracks			No superimposition No. of tracks	
				Hind paw under shooting	Hind paw over shooting	Lateral super imposition	Hind paw under shooting	Hind paw over shooting
1	2	3	4	5	6	7	8	9
	Protected Areas							
1.	Bandhavgarh N.P.	5	2	—	1	—	—	2
2,	Bandipur N.P. (TR)	4	1	—	2	—	1	—
3.	Bori S.	4	2	1	—	—	—	1
4.	Chilla S*	3	—	—	—	1	—	2
5.	Corbett N.P. (TR)	8	3	1	—	1	1	2
6.	Dudhwa N.P.	6	1	—	3	—	1	1
7.	Kanha N.P. (TR)	9	3	—	2	—	1	3
8.	Kaziranga N.P.	2	1	—	1	—	—	—
9.	Kishanpur S.	1	1	—	—	—	—	—
10.	Manas S. (TR)	3	1	1	—	—	—	1
11.	Melghat S. (TR)	53	19	7	14	2	2	9
12.	Madumalai S.	2	—	—	—	—	—	2
13.	Palamau N.P. (TR)	5	1	1	1	—	—	2

1	2	3	4	5	6	7	8	9
14.	Panna N.P.	4	1	—	2	1	—	—
15.	Pench N.P.	2	1	1	—	—	—	—
16.	Rajaji S*	2	1	—	1	—	—	—
17.	Ranthambhor N.P. (TR)	2	1	—	—	—	1	—
18.	Sariska S. (TR)	3	1	—	—	—	1	1
19.	Satpura N.P.	4	1	—	2	—	—	1
20.	Simlipal S. (TR)	2	1	—	1	—	—	—
21.	Sunderbans S. (TR)	2	—	—	2	—	—	—
22.	Taroba N.P.	2	—	—	1	—	—	1
23.	Wynaad S.	1	1	—	—	—	—	—
	Reserved Forests not in PA							
24.	Allapalli Forest Division	3	2	1	—	—	—	—
25.	Central Chanda Forest Division	2	1	—	—	1	—	—
26.	West Chanda Forest Division	8	3	1	2	1	1	—
	Total	142	49	14	35	7	9	28
	% occurrence to total in the category	100	34.6	9.8	24.6	4.9	6.4	19.7

N.P. National Park S—Sanctuary (TR)—Tiger Reserve

* Now included in the Rajaji National Park.

The recommended process for establishing tiger identities

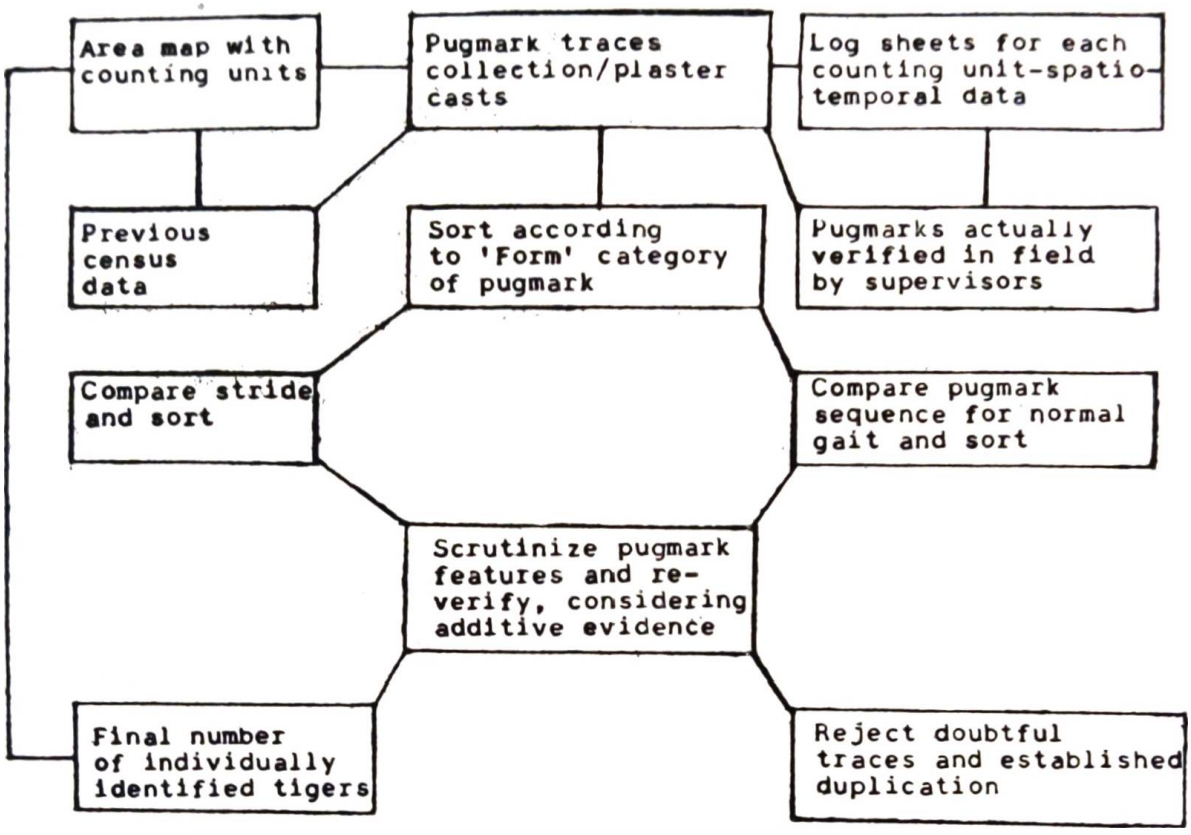

Area map with counting units
Pugmark traces collection/plaster casts
Log sheets for each counting unit-spatio-temporal data
Previous census data
Sort according to 'Form' category of pugmark
Pugmarks actually verified in field by supervisors
Compare stride and sort
Compare pugmark sequence for normal gait and sort
Scrutinize pugmark features and re-verify, considering additive evidence
Final number of individually identified tigers
Reject doubtful traces and established duplication

FIGURE - 2

Summary

Tiger tracks or pugmarks have been used by field men to identify and sex individual tigers. This is the basis of the tiger census technique. Apart from the pugmark itself, the stride and the straddle are additional features which help to confirm tiger identities. The normal gait of the tiger is another feature which can be used for the same purpose. The normal gait patterns, approach to interpretation and practical applications are discussed.

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Rare Mammal Collection in Nepal: Problems and Prospects

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Abstract

The paper describes the origin and history of mammal collection in Nepal during pre- and post-Rana periods. The present status of rare mammal collection for both scientific study, trophy values and problems of their maintenance and study are described. The prospects for rare and elusive mammal collection in the Himalayan kingdom of Nepal are described.

Introduction

Nepal : the word has loomed in the minds of western hunters, collectors and naturalists for ceuntries. The Himalayan kingdom of Nepal is situated along southern slopes of the Himalaya. This fascinating country lies between India to south and west, and Tibetan region of China to the north. It has an area of 54,363 square miles. It extends 300 miles east to west and 30 to 150 miles from north to south.

History of Mammal Collection

A. Pre-Rana Period

Mammals of Nepal are both very varied and interesting. The first person to bring this very rich heritage of this country to the notice of the mammalogist was Sir Brian Hodgson, the British Diplomat in Kathmandu during the years 1820 to 1822, and again, 1824 to 1834. He published several papers on his new finds and collected 903 mammals skin from Nepal. Although erstwhile Rana regime put restriction on his movement outside Kathmandu, he employed professional hunters to collect mammals from all parts of the country.

Rana Period

During the Rana regime, the ruling family possessed *Carte blanche* authority to shoot animals. All the collections of hunts were destined for the London Zoological Gardens (Ellison 1925). Maharaja Jung Bahadur was first foremost Rana Ruler of Nepal. He was an ardent hunter. In one hunting expedition towards 1846, he bagged 21 elephants, 31 tigers, 7 stags, 1 rhino, 11 wild buffaloes, 10 boars, 4 bears, 20 deer, 3 leopards, 1 boar constrictor, 6 pheasants. The hunting adventures of the Maharaja has been described by Lawrence

Oliphant in a book called "A journey to Kathmandu (the capital of Nepal) which was published in the year 1952.

Ranas were great lovers of nature. The wonderful collection of trophies displayed in Singh Durbar (Lion's Palace) reason to this day to bear testimony to their love for animals, and genuine delight which they felt in the collection of hides, horns, tusk, teeth and skins of mammals. Ranas frequently enjoyed tiger hunts, therefore good many tiger skins and mounted species preserves in Singh Durbar Gallery Hall. They also enjoyed fights between animals such as wild buffalo, bison and Tibetan sheep. Many valuable trophy collection now exist bedecked on the walls of Kaiser Library and Singh Durbar National Museum.

B. **Post Rana Period**

After Hodgson, Nepal remained closed for foreigners for more than a century. It remained a big question mark to the Mammalogist of the world in those days. In the year 1948, Dr. Dillion Ripley, an American Scientist, lead his successful interdisciplinary team funded by National Geographic and Yale University. Hence onward Nepal, the living vivarium of birds and mammals opened to scientists and naturalists. Most of the Hodgson collection had no field data, and indication of localities and they were collected by hunters. Ripley, 1948 with his expedition members travelled far wide and covered eastern and western parts of the country. He was perhaps the first man to collect bird and mammal in he field.

Nepal became free from herediatary Rana rulers in 1950. A democratic system aded by kings was started. King Mahendra Bir Bikram Shah was himself a keen hunter, uralist and philosopher. He had profuse and varitable experience in the National ory of mammals. He has described his first hand experiences in his book "A Hand : of Big Game Hunting". He maintained extensive hunting reserves. His collection of tro- are well preserved in the National Museum and in the Roval Palace of Kathmandu.

mal Collection in Nepal During Recent Periods

Considerable collection of mammal has been described by investigators in the past. ent among them are Thomas and Hinton (1922), Hinton and Fry (1923), Biswas hajuria (1957), Abe (1971), Mitchell and Punzo (1975), Jackson (1979), Ripley and Kitty (1980), Shrestha (1981, 1983).

l collection of mammal made in Nepal by local hunters and trappers suffers from uch a local name, altitude and ecological notes. To supplement missing data ation new rare mammal collections should be initiated in Nepal. Besides this old

collection existing various zoological museums should be better preserved for their use in posteriority.

Nepal Himalaya have not only one of the richest, but also the most colourful, unique and magnificent mammal life. More than 95 species of mammals have their abode in his region, some of them unique and incomparable. An opportunity to renew my contact ith the Himalayan mammals was provided to me recently, when National Park a Wildlife partment decided to take up mammal fauna survey of Langtang valley in 1984. This ve me an opportunity to observe and determine the changes in the fauna pattern in the on. But whatever I have seen recently is most alarming. A number of species of mals which could be called abundant in 1980 are now so much depleted that it will stifiable to call them "rare". Therefore, collection of representative mammals for ific study should be done before they disappear completely.

The distribution of rare mammals in Himalayan zone is not homogeneous and suffers ne distributional gaps. For example marmot (*Marmota babock*), which occurs at the f 3,962 m to 5,486 m is well represented in western Nepal and Kashmir. red deer (*Cervus elapus hangulu*) which is represented in Kashmir and Bhutan is absent from Nepal and Bhutan is altogether absent from Nepal. Furthermore *orientalis*) known to occur in western part of Himalayas intervening Kashmir, l Kumaun are absent in Nepal. Floristic distribution also reveals such distribu- Why such floristic and faunistic discontinuities exist is a matter of biological the future. Perhaps future mammal collection will give due answer to the n.

tion on some elusive mammals such as serow (*Caprocornis sumatraensis*), Pi (*Gazella picticaudata*), vole (*Pitmys sikkimensis*), pine vole (*Apodemus flavicollis*), *roylei*, *O. macrotis*, *O. lama*, *O. tibetanus*), water shrew (*Chirromogale platy-* w hare (*Lepus oistilus*), are very fragmentary. Therefore collection of these ll be helpful to clear up taxonomic as well as ecological problem of distri- lance. Furthermore, efforts should be made to collect lesser cats and len cat (*Felis temminiki*), marbled cat (*Felis marmota*), wolverine (*Helectis* hare (*Helectis nipalensis*), Hespid hare (*Carpolagus hespidus*), Himalayan *tus thibetanus*). A distinct sub-species of Himalayan black bear (*Selanarctus* is reported from Nepal This species need a firm identifi- In Nepalese fauna confusion

Potential Areas for Future Mammal Collection

Whole trans-Himalayan range is focal point for rare mammal collection in Nepal—Himalaya. A few sporadic collection has been done from this region by Abe (1971), Green (1981). A few virgin region remain in Nepal for mammal collectors these include Jumla Sapial, Rana-Regmo Finger, Arun Valley, Tamor Valley, Barun Valley, Mustang, Everest Dolpo and Annapurna etc. There is a bright chance to make a discovery of new mammals in the area as well as to make a startling cryptozoological finding of mythical snow man or yeti.

Maintenance of Himalayan Mammals

Some old collection of mammal is housed in National Museum which dates back to early eighteen century. Amog them a far century old leather cannon cover made up from the leather of wild yak by Tibetans has been displayed in National Museum of Nepal. The cannon was recorded in Nepal Tibet war during 1847.

The majority of the specimens of collected in Nepal are preserved dried, whereas a small number are stored in 75% alocohol. The wet specimen do not present much problems but considerable care has to be taken for dried skins and large mounted specimen. Because of inadequate storage area, uncontrolled temperature and humidity of the building, and non air-tight, non-yermin proof storage boxes and cabinets, and related problems faces more maintenance problems especially to the old and brittle specimens.

In Nepal a few professional taxidermist and skin collectors are available due to fact that the collection and preservation of mammals is time consuming and less paying. In far flung remote and inaccessible areas proper facilities of preservation are not available lack of good roads difficult terrian curtail possibility of bringing dead animal to the areas where good skiners and taxidermist exist. As central Nepal has good communication and transport facilities collection from this part dominates all collection from Nepal.

Lack of sufficient man-power with curaterial knowledge the preservation and maintenance of past collection has been a problem.

To transmit the knowledge of preservation and maintenance of mammal collection to the scientific community at large in Nepal it is urged to open an international Himalayan Museum in Nepal.

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The Fading Beat of Falcon's Wings

By

S.M. Osman

Hardly any attempt to study the causes of death and disappearance among free living birds of prey has so far been undertaken. It is simply believed that pesticide poisoning could account for a great portion of deaths among raptors. That pesticides are definitely involved in the death of a large number of birds of prey, there can be absolutely no doubt, however residual levels of D.D.T. and Dieldrin, in the body fat and livers of most raptors living in areas where such poisons are sparingly if at all used, can in the overall mortality score, become a sublethal factor only.

I speak of the Doon Valley where relatively low levels of DDT/Dieldrin are used for cereal seed treatment, and as such it is unlikely that this insufficiently important concentration of toxic material could in any way be directly held responsible for so great a decline in the numbers of falcons, particularly in the case of the Red Headed Merlin falcon which has virtually disappeared from the scene, not to mention the way other raptors have significantly diminished in numbers in the short span of the last thirty years. Surprisingly crows, kites, and vultures do not seem to be effected by the ravages of what may have decimated other birds of prey.

This may be due to some form of built-in body resistance provided by Nature to combat the ill effects of poisonous food ingestion and diseases that cause high rates of mortality in other raptors throughout the world. While on the subject of DDT, a study in depth regarding its direct and indirect effects on raptors, was undertaken by the author and the findings recorded in a paper published in the journal of the W.L.P.S. "CHEETAL". The article was titled "BIRDS BEETLES AND NATURAL HISTORY". *

Other causes of death in birds of prey include the incidence of infectious diseases such as Bacterial, Viral and overwhelmingly parasitic infestations that are predominantly of internal origin, and include the presence of helminths, nematodes and tapeworm cestodes that thrive in the large and small intestines, the duodenum and the gizzard of the host.

To fully realise this disappearing conduct in raptors, one has got to view this issue collectively and in its entirety. All life forms on our planet are tuned to a pulsating or cyclic frame of existence and raptors being no exception to this universal rule, have their periods of

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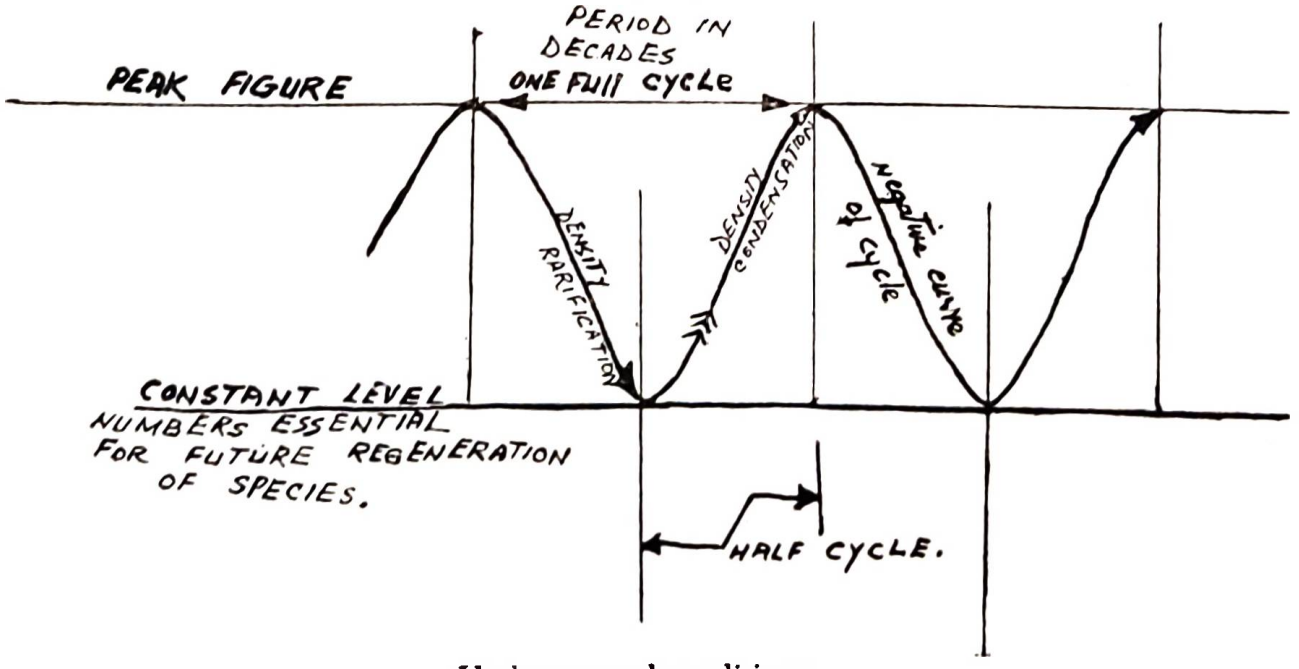
* Cheetal—Vol. 27, No. 1 and 2.

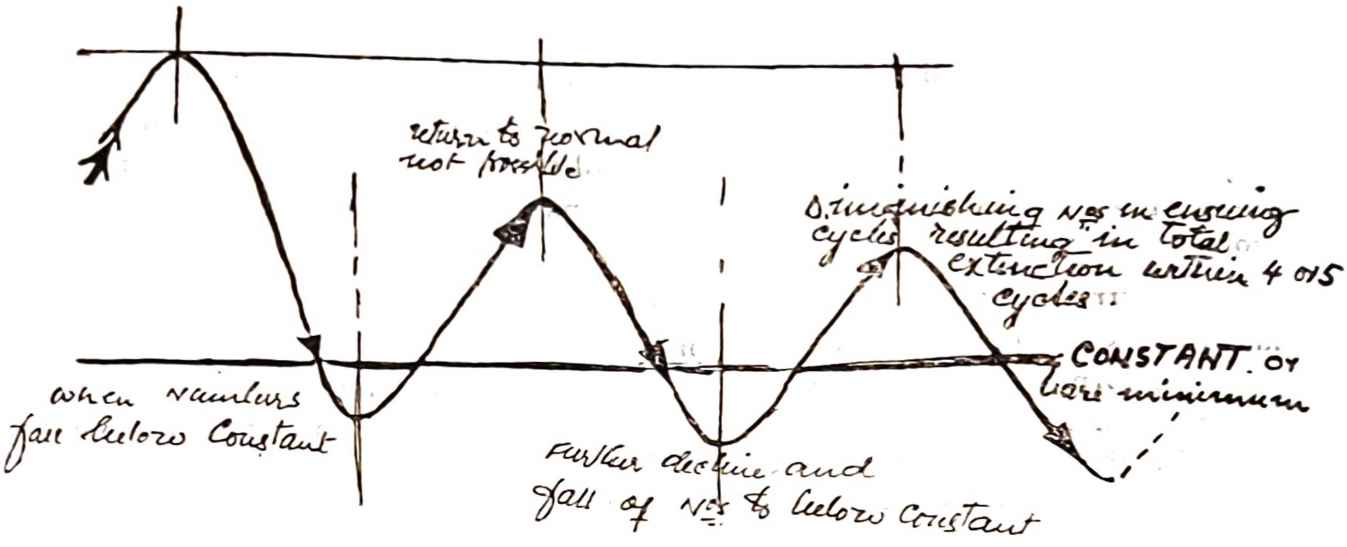
waxing aad waning of numbers. In short it is seen that after a certain numbers of years, the resident population of certain birds of prey rises to above its normal count only to get appreciably reduced to a bare minimum during the ensuing half-cycle oscillation, and to again rise to the peak figure by the close of the next full-cycle. The half-cycle count may be for all practical purposes taken to stand for a constant most essential for the species future regeneration.

Because of irregularities in the functioning of environmetal factors such as successive failures in the food-chain process that could be brought about by repeated drought conditions or some lingering form of epidemic prevalent among quarry on which raptors are most dependant for their survival, numbers of wild birds of prey will be seen to fall below the constant level for that particular species. This rarification in birds of prey population retards prompt recovery back to normal even after the cataclysmic event has passed away. Raptors with shorter pulsating cycles, prior to reaching a safe concentration in numbers, absolutely necessary for their regeneration back to normal, will find themselves being subjected to a rarification in density brought about by the onset of the negative curve in the pulsating cycle. In this way a continuous reduction in numbers is carried to the point of no return.

Such events in nature are not very common, besides they are unlikely to assume global proportions, being mostly confined to restricted areas. Unfortunately they do exist and could at times be responsible for producing deleterious effects on the regrowth of wildlife population for long periods of time within effected regions.



Under normal conditions



Environmental misfortune

Lastly we come to the principal source responsible for the disappearance of our magnificent birds of prey, and here the guilt is heavily weighed against man himself and that too, not because of the toxic pesticides that he produces in his laboratories, but because of his unquenchable thirst for money, accompanied by his total disregard for the survival of one of the most advanced species in the world-of-birds. Clandestine export of falcons, despite government restriction, and prohibition continues. Falcons are being exported and sold for large sums of money, and for every hawk that ultimately finds its way to Europe or to oil rich Sheiks in the Middle East, ten magnificent falcons must die at the hands of careless and callous bird merchants and trappers. These fraudulent individuals have no idea regarding the way falcons should be handled or taken care of; nor do they care. Mishandling is responsible for 90% deaths among captive birds of prey acquired or trapped by dishonest traders.

Unfortunately in the majority of cases it is the females of the species that fall victim to the depredations of bird merchants. It will be understood that male falcons or tiercels are not that highly prized by falconers the world over; hence the demand for these being comparatively less. In addition to all this it is noted that birds of prey fall easy victim to the trapper during the breeding season when they are most actively engaged in capturing food for their young. A net result of this inhuman practice of trapping falcons during the breeding season results in the loss of the entire brood of fledglings as well, once the parent birds are captured.

The great question before us immediately, concerns the imminent threat to the survival of some birds of prey otherwise, in a few decades perhaps, they will have altogether

vanished from our sight for good. In this connection I would suggest the setting up of a programme to deal in the examination of free living birds of prey. Examination would consist of basic screening; investigating the captured falcons faeces for telltale helminth infestation; appropriate blood and fat specimens collected and screened under the microscope, and ultimately the raptor released back to the wild.

In this way valuable data can be obtained indicating prevailing health conditions among birds of prey, and knowledge thus collected would be of relevance to the conservation of free living raptors in the immediate vicinity of the research station. Such studies would further help us in collecting material to enhance our here-to-fore scanty knowledge, and ultimately in finding ways and means for halting the dangerously downwards trend among our raptor friends.

The second component of our enterprise should consist of persuading the authorities to institute stringent measures against bird merchants who are caught violating rules laid down by the authorities. Captive breeding programmes for some endangered falcons be taken up, and encouragement extended to those who are already engaged in the experiment. Fledgling falcons obtained through captive breeding agencies may be purchased by the government and used for restocking dwindling numbers in the wild.

To increase public awareness, functions, talks, lectures and slide shows, and possibly live demonstrations of flight patterns by falcons that are trained to fly to the lure, be arranged for the benefit of educational institutions, public foundations, armed forces, and societies dealing in wildlife.

Without the government's help and encouragement, in terms of facilities extended, and monetary aid proffered, the setting up and functioning of such a scheme is impossible hence, assistance by the government is of primordial consideration for its success.

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Applied Approaches of Bird Management—Scaring

By

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Management of Vertebrates in field conditions is complex due to multiple factors and status of involved species. Basically it involves two aspects: (1) protection of the species itself, including propagation, conservation or in terms of maintenance of natural ecological balance, and (2) protection of our involved or affected economic, ecological and famed interests. Later one is often referred as applied management. However, in certain cases of first category too, applied aspects may be involved. In totality, all these comprise the true, meaningful and according to needs, the subject of Vertebrate Management. The subject is thus multidisciplinary warranting studies on directly or distantly related subjects in different perspectives. For these besides many known necessities, varied innovative study approaches to various integrals of habitat and species may be necessary, viz., field studies on evaluation of various behavioural responses to different factors and its application according to management needs. The subject thus has vast magnitude and scope of future lines of research. Similar is the scope in the subject of Bird Management. It however, warrants priority due to several factors and importances. Unfortunately appreciations have been lacking. It therefore warrants a perusal of needs of management and complexities in bird management.

Needs of applied bird management could be in any situation wherever a conflict due to a bird to our economic interests is felt, i.e., a problem due to birds is encountered. To cite all examples would mean a voluminous coverage. These may be referred to Bhatnagar (1976-a). These days in India, need of applied management is high in controlling bird strike hazards in aviation (Bhatnagar, 1984) and agriculture including horticulture, all over the country, because of the losses affected by birds in these crops. Although, todate precise estimates on extent of loss affected is not available (Country wide), yet available examples (Agarwal and Bhatnagar, 1984—deals studies from several parts of India by various workers) amply indicate high needs of controlling crop losses. This is also necessary as these days high economic inputs are involved in crop raising. In certain crops like oil seeds, many a time damage is excessive and otherwise too our productions is so low that we are spending crores of rupees in importing edible oil. These are some of the reasons why we do require applied studies on bird management which necessarily does not mean resorting to approaches involving killing of birds unless truly justified in various perspectives. For this best example is management of bird strike hazards in aviation where cost per fighter aircraft may range as high as

Rs. 16 crores besides other costs in operating it and dangers it might pose if it crashes in a thickly populated area. In this case too very judicious considerations are taken for last resort of bird management i.e., population reduction.

Bird management in agriculture too is beset with numerous complextities which variously vary from situation to situation and may also vary from species to species. These are due to several factors. Birds are less hardy than mammals, have multiple economic roles, varied status and pose various complexities in its management due to flight, intelligence and adaptability, besides habitat preference in several species. For example, extinction of 60% species is attributed to habitat destruction. Further due to deep relationships of birds to vegetation in general (viz., for roosting, nesting, vegetation cover and for food etc.) complexities in management are high. These have not been accorded true appreciations. Obviously, in 2060 species that we have in India, feeding habits alone show wide variations and many species are now showing shift in dietary habits, viz., Mynas turning depredators of crops in Rajasthan and Punjab. Situations vary similarly in many other cases too. Rosy Pastors were known natural enemies of Desert most dreaded insect pest of the world. Same species at its immigration route in India, not finding Desert Locust (due to massive control at International level) shows shift to feeding on grain crops. Like wise in certain pockets around Ghana Bird Sanctuary, Bharatpur, build up of congregations of Demoiselle and Sarus Cranes coincides with maturity and harvesting of wheat and barley crops, when these species affect high loss. Sarus Crane, otherwise too, affects considerable loss to sprouting seed and seedlings of various crops in the area. In many other areas similar situation is seen with such crop affecting species, comprising nearly 30 per cent of the total Indian species (Bhatnagar, 1982). This invokes challenging management problem(s) as how to control crop depredations (damage or loss) by these bird species (many are protected or are endangered) without any adverse effect on the species, crop, the environment, as well the related components, i.e., the control method should be safe in all perspectives, economical and effective. Currently studies on several approaches are therefore being taken up all over the world (Bhatnagar, 1984-a and b), because of the importance and that these with appropriate modifications can also be useful in conservation programmes (applied studies also aim in finding weak stages in species). For example, if a protected species can be contained within an appropriately demarcated safe area and its intrusion(s) in other areas is checked, it is most likely that economic conflicts and persecution of the species would be reduced. These also invite our attentions to cause—why should a species from the protected area move out to other areas. Obvious necessity is that so demarcated protected area(s) are to be so appropriately self sufficient and sustaining that protected species should not move of the area. Failing this, the obvious need is to appropriately contain the species. How do we do this without adversely affecting the species ? Answer would be from applied management only.

This is the reason why there is an urgent need to modify our study approaches currently at vogue in India, as well at the planning stage and in the training component of such programmes.

Bird scaring as a means of controlling birds holds promise and deserves special attention in India due to several reasons. Theoretically, scaring involves introduction of an unusual object in preferred niche or invoking 'unusual' behaviour in the species that induces fright and consequently affects scaring. The aspect has drawn wide attention all over the world. Basic reason is that it enables us to cover most of the plus points in bird management, viz., management of the problem by exclusion of the involved species etc.

Bird scaring is in vogue since antiquity and the need perhaps arose with the advent of extensive monoculture of plants for food purposes which perhaps attracted birds, being the readily available food source. Leaving these hypothetical interpretations one finds that use of scare crows, beating of drums and yelling by human beings to scare birds have been popular all over the world since antiquity. With advancement of science, considerable improvements have come up in bird scaring approaches. Today these have wide applicability in such distantly related problems as in control of bird aircraft strike hazard control (Bhatnagar, 1984-a and b and c). It is now justified to classify various scaring methods into categories like, general, mechanical, biological and chemical.

General scaring needs little introduction as had been in vogue all over the world and can be affected by any means. These are conventionally well known ranging from use of various types of contraptions like sling shots to throw pebbles, beating of drums, use of various types of scare crows and yelling by human beings. Some of these have now found considerable improvements and are being subjected to comparative evaluations besides efficacy in terms of input expenditure like economics and man hour spent etc. For example one man employed to scare birds from a field can effectively scare birds from 2-3 acres of land for 8 hours. This means that two men are required to be employed for entire bird activity period. According to present norms, daily wages for two men would amount nearly Rs. 35/- per day for simply scaring birds which in truer senses is actually wastage of man power. Further this expenditure for most crops is required for minimum a month (minimum 7 days during sowing to sprouting and 20-25 days for grain formation to harvesting stage). This thus may necessitate expenditure of about Rs. 1050/- for 30 days. It is obviously going to mean economic stress on average Indian farmer or man hour spent by him for the purpose deprives him variously in terms of sociological aspects, or even spending his energies to other job of the agriculture. In context to forestry it deserves mention that while we are so conscious of stepping up our afforestation programmes, we still have not paid any

attention to study if there is any seed depredation by any vertebrate and to what extent it is affecting natural growth of our forests ? In some countries the aspect is paid due attention. These are also some of the reasons which necessitate further improvements and development in our approaches.

Mechanical scaring involves use of any mechanical device (including some examples discussed above) for scaring. Most poppular device for scaring had been automatic acetylene exploder gun (Fitzwater and Prakash, 1973, Bindra and Toor, 1973). The gadget operates on acetylene gas produced, accumulated in a cylinder and set to explode through a funnel shaped barrel at pre set interval(s) with a loud bang. The bang has a scaring effect on most of the birds and certain mammals. One gadget provides effective acoustical coverage for 3-4 acres (Verma *et al.* and Ali, 1963). Efficacy of the gadget has been disputed and primary reasons appears to be its improper use. Proper use involves periodic changing of frequency of bang (Bhatnagar, 1976-a and b), camauflauging and shifting of gadget (Bindra and Toor, 1973) and increasing the pitch of bang by placing the gadget on an empty drum (Shivanarayan, 1984). In some developed countries having vast stretches of cultivable lands needing protection from birds firing of 12 bore cartridges from a moving vehicle during morning and evening are common practices. In India however, this is not appropriate due to various reasons.

Various other ingenuities with varied success have been tried all over the world. Use of 'mechanical human effigy with moving arms (Markgreen, 1960 in Murton, 1974) has been found most effective when they have 'Eye spot pattern of predators' (Markgreen Effect). Likewise even models of corpses of birds spread in field in unnatural posture like out stretched wings have been found effective in case of Wood Pigeons (Murton *et al.*, 1972 and Murton, 1974). Most of these pose various limitations for utilisation in India. These however, amply indicate needs of initiating behavioural studies with a modified approach, i.e., one that at least in some ways helps or aids economic utilisation of the study. Here it deserves mention that so far these have been lacking. For example, if, clay models of predatory birds hung on poles have scaring effect, the approach is not only going to save the crop but is also expected to promote economic returns to rural potters too, besides saving the bird species. Such are the innovative approaches in our study or training programmes that warrant priority than the adoption of conventional approach to Vertebrate Management currently popular in our country. Here it deserves mention that utilisation of existing control approaches of insect pest management warrant appropriate modification. In insect pest control, by and large, approach is limited to use of lethally toxic insecticide most of which have adverse effects on other fauna or environment. One such approach involves use of seed dressings with lethally toxic Compounds—the Carbofuron in case of Sorghum.

studies on the aspect deserve mention. In 1974 I had an opportunity of meeting some persons in Barmer, who told that to catch a Chinkara all one has to do is to move with a Saffron coloured cloth towards the animal. In this too, need of study warrants our attention. In case of birds, several insecticides are coloured either green, greenish blue or red. The colour is to check mixing or to be used as warning and often the belief is put forth that seeds so treated with such coloured chemicals would not be picked by birds, i e., unwanted mortality in birds would not be there. A study on pigeons (Bhatnagar *et al.*, 1984) has indicated that this is not always true. Therefore there is a need to use caution in use of such seed treatments in areas protected bird species are met with in cultivated fields.

Amongst mechanical measures, bio-acoustics or replay of bird scaring, warning or distress calls to scare one or other species from a area under acoustical cover, are being tried in developed countries. The subject owes its birth to the observation of a graduate student (J W Jumper) that replay of distress calls of Starlings has scaring effect on a congregation at a roost. In India the subject has not found much interest. Obvious reasons appear to be economic limitations involved in production, recording and replay to provide acoustical control. The subject warrants impetus in both birds and mammals, as may have diverse applications, say while calls can affect scaring, calls can also be used to attract vertebrates. Likewise there is a need to initiate studies on responses to different sound frequencies like sub sonic, ultrasonic etc. Unfortunately practically no attention has so far been paid to the study on aspect in relation to Indian Vertebrates. This further indicates how multidsiciplinary is today the subject of Vertebrates Management. Obviously, if today we do not incorporate appreciations of these in our training programmes, our future manpower is not expected to be abreast with latest approaches.

Among other mechanical measures, use of Mettalised Reflective Plastic Ribbon for scaring birds has recently drawn worldwide attention. The ribbon owes its origin to Japan and today it is being tried all over the world on various crops, but results are inconsistent (Bruggers *et al.*, 1986). In India with improved method of its use, results have been promising (Bhatnagar, 1987) and have lately drawn wide attention in Indian News Media. The ribbon made of a thin polyethylene film with shining anodised polish in silver colour on one side and bright scarlet red/maroon on other, shimmers with wind movements and reflects sunlight. This appears as if a fire flash is moving and so has scaring effects on most birds. In the method, ribbon in width of 1.2 to 2.5 cm width is stretched over wooden stakes all around field (being damaged by birds) at a height of about 50 to 100 cm from the plant stage damaged. Inter distance between two ribbon rows is to be kept from 1.0 to 5 m which is to be reduced if bird damage persists. In areas, birds that move on

ground to feed (i.e., 'graze') are met with, like cranes, ducks and many pheasants, including the Indian National Bird, on sides of fields too, rows of ribbon should be fixed. This method of scaring has so far provided wide appreciations which is primarily due to its simple and effective application besides it is economical too. In terms of varied status of Indian Bird species, such safe methods deserve attention. Here it deserves mention that it is likely that the ribbon may also provide considerable degree of damage control from small mammals. Therefore studies are suggested. Production of this ribbon is primarily for plastic brocade abundantly used in 'sari zari' or for various wrapping purposes. Field tests in India (Bhatnagar, 1987) have indicated that it is so far most economic bird damage control method.

Chemical methods for dispersal of birds basically involve bringing birds into contact with chemicals—direct (with coatings on perches etc.), with ingestion of treated material (as in baits) which induce erratic or frightening behaviour (viz , by 4-Amino pyridine compounds), in turn brings about dispersal or scaring. Chemical approaches are however, not safe as necessary manifest is to have expertise or else mortality rate may be as high as 20 per cent. Therefore, for Indian conditions, where we have number of protected species, use of chemical methods for dispersal and scaring are not appropriate. However, details may be referred to Mehrotra and Bhatnagar (1979) and Bhatnagar (1984-a and b).

Foregone discussions on various species, leads one conclude that there is need to modify our study approaches on Vertebrate Management for providing applied utilities too, than narrowing bias to one aspect only. These also indicate needs to widen scope of our currently in vogue Management programmes ranging from planning to training and teaching levels. This is necessary if we are to account for our input expenditures on our current programmes and benefits that are expected by little modifications in our approach, i.e., 'accountability in wider perspectives'. Vertebrate Management therefore warrants appreciations in various pertinent perspectives. Regarding management approaches of applied bias, it is time that we give due appreciation to needs of developement in context to varied status of our involved faunal and environmental conditions, besides implications thereof. In this context, for bird damage control, development of safe, effective, economical approaches like scaring warrant attention.

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Trout fishing, an outdoor sport in Himachal Pradesh

By

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Background and history: Fish earned its name not only as a rich protein diet but also an important age old recreation all over the globe—the temperate countries now dominating the scene where anyone going to relax outside his house thinks of quiet camping along a stream and pull a fish out. Leased out streams and lake owners and the States, now earn billions of dollars in foreign exchange every year. Fishing, as game, was never uncommon in India also. Indian waters contain several species of fish valuable for angling sport but the mountain streams, particularly of the Himalaya, resplendent with Mahseer and Trout, have carved out a respectable place. Himachal Pradesh amongst these was already a fore-runner and trout added a feather to its cap since 1916. Now, when tourism is the talk the name of trout angling, or trout for table, is always an important mention.

The sprawling network of streams of Himachal Pradesh flow in the backdrop of snow-clad mountains, some originate from old glaciers or snow-melts and yet others from cold springs. These clean and cold waters gush and gurgle over and through the rocks making way through the Pine, Deodar and Alder forest thickets. Serpentine, more than 600 Kilometres of these now abound with the sportful trout.

Endemic of the European streams, trout was first planted in the river Beas system of the beautiful Kullu hills in the year 1909 at the combined afforts of Mr. G.C.L. Howell and Gen. Osborn, a great angler of the time. 23,00 eyed eggs of Brown trout were brought from Kashmir where the fish was successfully planted in the year 1900. The seed was dispersed into various tributaries where these thrived exeedingly well. Fishing was opened to anglers in 1916. Sport of any sort those was the pride of the Rulers of princely states and soon stocking of similar behaviour streams in Mandi (now district Mandi), Rampur (now Kinnaur and Shimla districts) and Chamba states was undertaken in 1917 and around this time. Except in Chamba, all was a success.

Rainbow trout was also attempted in 1919 but the strain introduced was a migratory nature (steel-head) that did not thrive long into such cold waters and therefore the culture was abandoned in 1938. Rainbow is now restricted only to commercial farming.

Planting of trouts in the lakes of the Himachal is of recent begining. Brown and Rainbow have been introduced in Chandra-tal of Spiti valley, a tribal subdivision. Fish above 2½ kilogramme is common there. An enthusiastic and zealous tracking angler would find it most sporting with plugs or sunken nymph though not to write off spinning and fly in

morning and evenings. The monsters are well fed and would come to good hands only at this lake that can boast, perhaps, to be the highest lake in the world (4100 metres) teeming with trout.

Waters detailed below now abound with trout where fishing is enjoyed by anglers:-

Sl. No.	*Name of stream*	*App. length*	*Location*
1.	River Beas	70 Km	Kullu distt.
2.	Manalsu (tributary of Beas)	20 ,,	,, ,,
3.	Sujain ,, ,,	20 ,,	,, ,,
4.	Fojal ,, ,,	25 ,,	,, ,,
5.	Sarbari ,, ,,	45 ,,	,, ,,
6.	Parbati ,, ,,	50 ,,	,, ,,
7.	Gadsa ,, ,,	30 ,,	(Parbati valley) Gadsa valley Kullu distt.
8.	Tirthan ,, ,,	70 Km	Kullu distt. (Banjar valley)
9.	Sainj ,, of Tirthan	70 ,,	Kullu distt. (Sainj valley)
10.	Kurpan ,, of Satluj	50 ,,	Kullu distt. (outer Seraj)
11.	Uhl and Lambadug (tributary of riv. Beas)	105 ,,	Mandi distt.
12.	Pabbar (tributary of Yamuna)	55 ,,	Shimla distt.
13.	Baspa (,, of Satluj)	20 ,,	Kinnaur distt.
14.	Bhandal (,, of Riv. Ravi)	40 ,,	Chamba distt.
15.	Chandra-tal	50 ha	Tribal area of Lahaul & Spiti district

Fishing norms: Fishing opens on 1st March and closes on 1st November, every year, the winter being their breeding period. Fishing is permitted only with artificial baits such

as spinners including spoon, fly (dry and wet) artificial plugs and artificial spinning minnows. All streams except Parbati and good for fly fishing. Dry fly played from March to May is exhilarating. The choice of fly and colour varies and depends on seasons, the colour of water and the nature of appearance of natural flies. Landing a good catch is the privilege of the person handling fly with art. Tri-dent spinners are permitted. No fish below 23 cm can be retained and six fish per rod per licence in a day is the bag limit. Any damaged fish of undersize would count towards the bag of six. Licence is issued on day basis per angler rod for rupees 10/- and a weekly for rupees 50/- which are issued streamwise/beatwise. There is a provision of annual licence at rupees 350/- valid all over the state trout waters. Licensing offices are suitably located to the convenience of anglers. This facility is also available from local tourist offices.

Approaches: Tourists have many choice to reach these places via Delhi, Chandigarh and Pathankot. Anglers desirous to reach trout waters of Kullu and Mandi can go by bus from Delhi or Chandigarh. Kullu is 356 Km from Delhi. Yayudoot service operates daily from Delhi-Chandigarh to Kullu. Those wanting to play in Baspa and habbar have to journey through Shimla. Baspa is one day journey from Shimla into the lovely inner Himalaya and Pabbar half a day by bus. Beas and its tributaries in Kullu and Mandi districts can also be approached from Pathankot through the beautiful Kangra valley. Bhandal in Chamba is a day long journey from Pathankot. Chandra-tal is one day journey from Manali by bus and on foot if one starly earts else this involves two days. Rest houses and tourist lodges facilities exist everywhere. Booking is by Public Workds Department or the Deputy Commissioners, and tourists lodges by the Himachal Tourism. ITDC also operates at Kullu and Manail.

Fishing Aids: Fishing can not be enjoyed unless stream banks are approachable and pools and rapids combine and banks slope into for easy landings. Both banks of streams, in most cases, are negotiable. Foot and motorable bridges, located at reasonable distances, facilitate crossing to the other side. Gradual slope of stream banks is just that one desires for a playful play with fly and spinning and than easy landings of the striggling fish. Those who love fly fishing have choice in the tributaries of Beas viz. Tirthan, Sujain, Gadsa, Kasol, upper reaches of Uhl and Lambadug near Brot. In Baspa the fly rise a fortnight to three weeks late. The most exhilarating period is from March to May. March-brown, Teal and Green-well, Blue-dun Yellow-dun do well in March and April; the Coachman, Black-gnat, May-fly, Olive-dun, Pheasent-tail in May and June. The larger and main streams tend to get turbid during July and August (sometime up to mid-September) and therefore spinning is the answer. A warm quiet weather in May is sportful on winged dry fly that induce the trouts to rise the most.

Spinning is common method of rapid fishing these days. Most streams are suitable for 5 to 7.05 grammes spinners (No. 1 to 3) but larger streams such as the Beas, Parbati and Paber can be worked on 12 to 14.8 gm In numerical order the weight of Indian and foreigh make spinner differs. Golden is suitable in March/April and September. In other months the water tends to get turbid and then silver or copper is the choice. A black spinner with red and yellow dots spins to give deception of May-fly in May/June and thus most successful. Golden or silver with red spots is successful in clear waters of March. A Yellow spinner No. 2 in conjunction with a good celluloid/plastic artificial minnow—a roach or a chub, is also very successful in most streams.

A guide table for spinner/plugs preferences

Size of spinner or kind of other baits	Weight in gm	Water selection		
		Velocity/sec.	Width of stream in m	App. depth in m
0	2	5-10 cm	3-5	Up to 00.5
1	3-3.40	10-30 cm	3-7	Up to 1.0
2	4.4-5.3	30-50 cm	up to 15	depth of no consideration beyond this size.
3	5.3-7.05	50-70 cm	up to 20	
4	12	up to 1.5 m	above 20	
5	14.8	-do-	do-	
Hopper	8.5-14	up to one m	-do-	
Plug	16.1-19	-do-	-do-	

Fishing rod: A light 8'-4" rod wite 9" to 12" handle is good enough for fly fishing and shorter size, 5"-6" for spinning. Short size rods are a necessitg for the smaller tributaries.

Fishing line: A light colour line is preferred for dry-fly and green for wet-fly (a six inch below the surface probe for lurking and watching trout). Line may be greased line or bubble-latex. Llne of 3 to 9 lbs. breaking strength holds good for spinner weighing up to 7.05 gm and 12 to 20 lbs. for 12 to 14.8 gm spinner or hopper and pulgs.

Fishing conditions: You may expect a good size trout anywhere but the larger ones are in river Beas, Parbati (this stream is unworkable on lower reaches from mid-May to August) and Uhl/Lambadug, yet again the larger ones are always under the gorges and shaded rocks. The most common expectation is near and under an Alder plant foliage. The Tirthan and Sainj have higher incidence but the size is usually to the legal ength. To probe for the bigger 'monsters' ane may have to labour up into quiet gorges and forests. Fish up to 8 Kg have been caught (1924, see photograph). The old records are no jugglary of figures that go to cite Mr. Biernacki catching 342 trouts weighing 235 lbs.-9 ozs. in a period of 35 days, in 1923. One may not get this number during these days of high incidence of fishing in a disturbed and spoilt environment all over but one can sure find satisfaction to his skill and art. Walton said three hundred rears ago "he who hopes to be a good angler must not only bring an inquiry, searching, observing wit but he must bring a large measure of hope and propensity to art itself"—one whe desires tc follow this can achieve this on the trout streams of Himachal Pradesh.

Trout has not only become an angler's dream but one of the most interesing outdoor sport and Himachal has now built in a reput able place for itself on the map of angler's paradise. over a thousand anglers at an average visit the state annually and 90% of them to Kullu valley alone. A large section of them book for fishing of trout. Fishing game has become so much a part of the society that there is a Fishing Advisory Body and an Anglety Association of Himachal Pradesh that holds angling competitions every year somtime sponsored by reputable organisations of the country. Angling sport lovers from different parts of the country come to share the fishing fun. Those who intend to obtiain fun while frolicking with nature and to sother their tired minds would find the secluded streams of Himachal an ideal place to search. Depletion of stocks did occure, as anywhere in the world of these times, but the practice of improved methods of raising population of fish are putting the sport back into enjoyable horizons.

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Review of the Protected Areas System in the Indo-Malayan Realm

by SAMEER SINGH
Vice Chairman CNPPA for the Indo-Malayan Realm

In February 1985 a working session of IUCN's* Commission of National Parks and Protected Areas (CNPPA) was held on the Corbett National Park, Uttar Pradesh (India), to focus attention on the protected areas of the Indo-Malayan Realm. Park professionals from 12 countries in the region met for the first time to review the status of conservation efforts being made in their respective countries. They recognised the need for an overall assessment of the adequacy of the protected areas system thoroughout the realm and hence the preparation of a systems review was included in the "Corbett Action Plan" adopted at this meeting.

The task of conducting, preparing and disseminating widely such a systems review, using modern biogeographic concepts, was assigned to the IUCN/CNPPA. The later, in collaboration with the United Nations Environment Programme, engaged consultants John and Kathy MacKinnon to undertake this important work. The end-product, after more than two years of intense work by the consultants; is a two volumes review which has been just published and can be obtained from the IUCN Conservation Monitoring Centre, 219 C, Huntingdon Road, Cambridge CB 3 oDL, U.K., or the IUCN Publications Services, Avenue du Mont Blanc, CH-1196, Gland, Switzerland.

The first volume is the narrative part running into 284 pages and divided into five sections as follows:

Part One is the introduction, dealing with the objectives and criteria of Protected Areas; the aims and objects of the review undertaken, the Biogeography Theory and the Protected Areas System Designs; and the methods and approach of the review.

Part Two is mainly concerned with explaining the Indo-Malayan Realm: its physical limits, geological and biogeographical history, geography and physiography,

*IUCN stands for International Union for Conservation of Nature and Natural Resources. It is a unique network of governments, non-governmental organisations, scientists and other conservation experts, joined together to promote the protection and sustainable use of living resources. Founded in 1948, it has more than 500 member governments and NGOs in over 100 countries. Its six Commissions consist of more than 3000 experts on education, ecology, environmental planning, environmental policy, law and administration, environmental experts o nprotected areas and threatened species.

climatic conditions, vegetation cover, floral and faunal characteristics, human history and man's impact on the environment in the region, etc.

Part Three deals with the protected area coverage by biogeographic units in the realm. For each of the distinct biounits, an assessment has been made of the total area protected and the extent of coverage of the main natural vegetation types.

Particular attention has been paid to distinct habitats such as mangroves, swamp forest, lowland rainforest, etc. The biological richness and endemism of each unit and the adequacy of protection of species of special interest has also been attempted. Further, major gaps in the protected areas systems have been identified and proposals made for extending and/or improving the current situation.

Part Four relates to general conservation issues of the realm like population pressure, threats to forests and wetlands, protection of critical habitats, species conservation needs, wildlife trade, and species coverage by reserves. This section is of special interest as it considers problems faced by both people and wildlife and the conflicts between the two.

Part Five is entitled 'Priorities for Country Action' and is thus of special importance. It reviews national protected areas networks, on a country by country basis, and gives recommendations for extending and improving national reserve systems. Other conservation action has been recommended where appropriate and the responsible agencies identified. The countries included are: Bangladesh, Bhutan, Brunei, Burma, Southern China, Christmas Island and Cocos (Keeling) Islands, Hongkong, India, Indonesia, Japan (Southern Ryukyu Archipelago), Kampuchea, Laos,, Malaysia Maldives, Nepal, Pakistan, Philippines, Singapore, Sri Lanka, Taiwan, Thailand and Vietnam.

The second volume contains detailed maps depicting the original vegetation types, the biogeographical divisions, and the remaining forest and protected areas of the Indian, Indo-Chinese, Sundaic and Wallacean Sub-Regions.

The short and simple explanation of the whole exercise is that it seeks to examine the ffectiveness of the current coverage of protected areas in the Indo-Malayan Realm as well as to identify the gaps and shortcomings and to indicate the action required for ensuring that sampels of the Realm's biological diversity may be maintained for posterity.

The role of protected areas in maintaining essential ecological processes and life-support systems and preserving genetic diversity is well recognised. This role assumes special significance in the Indo-Malayan region, which presents one of the biggest paradoxes in conservation: it is the home of well over half of the world's human population as well as some of the richest and most distinctive eco-systems on Earth.

In this background, the Review presented by John and Kathy MacKinnon becomes specially relevant and topical. In another sense, it is work of a pioneering nature because this is the first time that such a comprehensive coverage of the whole region has been attempted. Having travelled widely in the region and with their personal knowledge of the situation in some parts of South and South-East Asia, the MacKinnons have overall done a commendable job.

Here, however, two points need to be made. First, it should be noted that the Review is more or less confined to terrestrial protected areas and does not deal with the marine habitats of the realm. This does detract from the comprehensive coverage of the subject. However, as mentioned by the authors, earlier R.V. Salm and M. Halim had produced studies on the marine and coastal resources of the region. Secondly, the review has drawn heavily on preliminary drafts of the directories of protected areas of the realm under preparation, by the IUCN Conservation Monitoring Centre and such other data or information which has been made available in the last two years by various individuals and organizations from within and outside the region. Naturally, there has been no time for any ground truth verification. Perhaps this is not even possible considering the nature and scope of the whole exercise. In any case, it is afterall an overview. Nevertheless, it is well to bear in mind that such an overview is bound to suffer from over-generalizations and that it can not possibly give equal and adequate treatment to every biounit. It is for this reason that, as stated by the IUCN President Dr. M.S. Swaminathan in his Foreward "IUCN hopes that this will be viewed as a working document and that it will stimulate action at the national leval. IUCN and UNEP indeed will promote national-level reviews of protection areas which will allow finer resolution and more detailed assessments."

As far as India is concerned, it is worthy of note that the wildlife Institute of India, Dehra Dun, has already undertaken a much more detailed review of the Indian protected area system' also based on biogeographical considerations. This project, initiated under the Government of India's National Wildlife Action Plan adopted in 1983 has prepared a biogeographical classification for India on the basis of floral and faunal associations. Using

this classification, the project is currently reviewing the location, size, viability and quality of management of all existing protected areas in the country and identifying new areas for protection status. A preliminary report shows that as yet many States have not reached the recommended goal of 5% land area proposed as conservation areas.

Note :-

The Indo-Malayan Realm is taken to be the whole of tropical Asia from the mountains of Baluchistan in the west, including the whole Indian sub-continent as far north as the treeline on the South Himalayas, extending through Indo-China and the tropical fringe of Southern China, through Indonesia and Philippines as far as the eastern realm boundary which runs to the west of Halmahera and Buru in the Moluccas (Maluku) and Tanimbar in the province of Nusa Tenggara, Indonesia.

The realm is treated as four separate sub-regions—Indian, Indo-Chinese, Sundaic (extending as far east as Palawan, Borneo and Bali) and Wallacean. Geologically all are rather recent. India drifted northwards to crash into the belly of Asia only some 15 million years ago, causing the Himalayas to rise up as a natural boundary to the new realm. Most of the Indonesian islands emerged from the sea at about the same period. The Sundaic and Wallacean sub-regions are still geologically dynamic and lie on active volcanic area.

The Indian sub-continent and the Sundaic sub-region have acted as major amphitheatres for biological evolution. Much of the endemic fauna and flora of India has probably been lost as a result of human modification of the sub-region but the Sundaic sub-region remains one of the richest parts of the globe in terms of species richness and levels of local endemism. Some of the isolated islands of the Wallacean sub-region also show very high levels of faunale ndemism.

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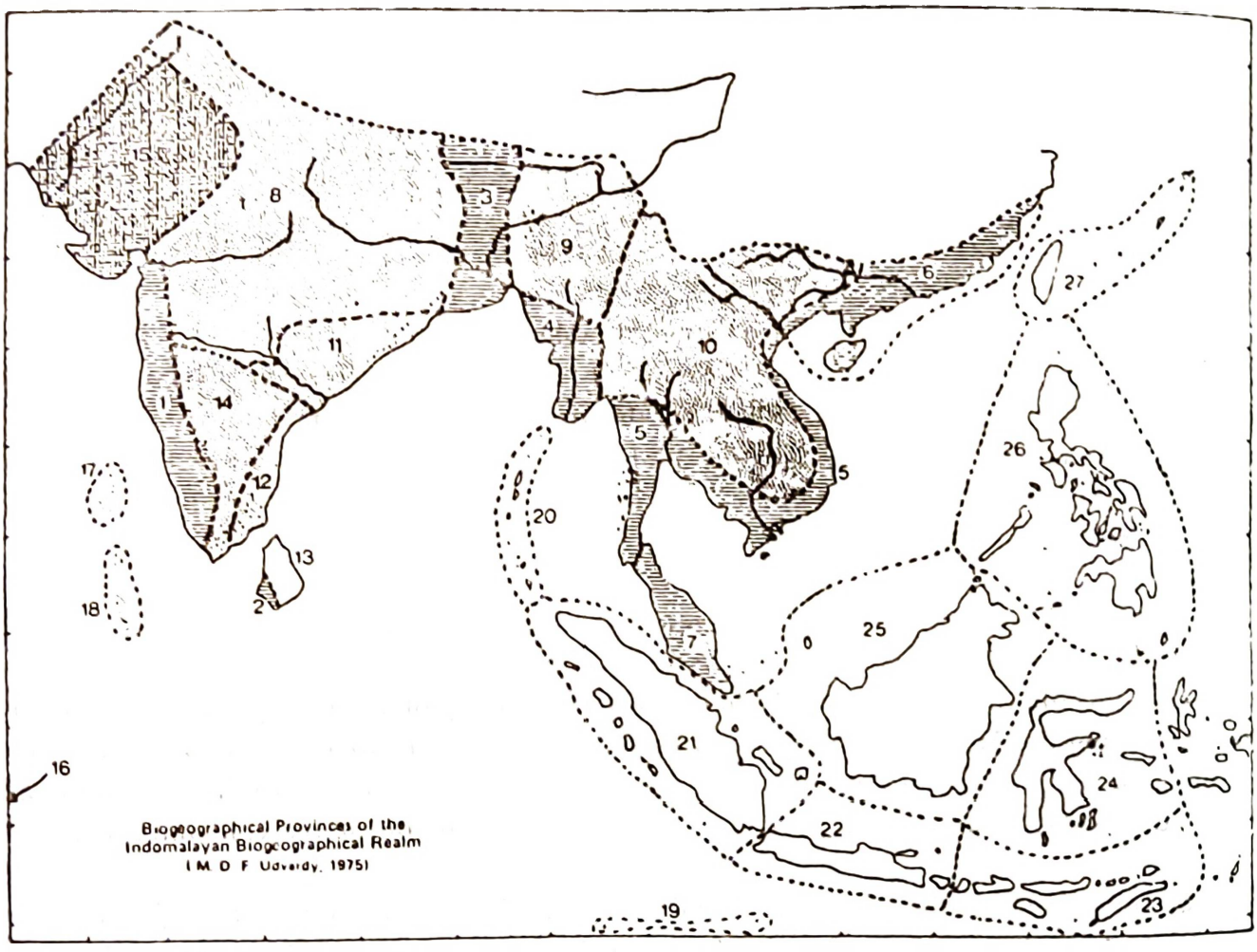

The Indomalayan Realm (4)

No.	Biogeographic Province	No.	Biogeographic Province
4.1.1	Malabar Rainforest	4.16.13	Seychelles & Amirantes Islands
4.2.1	Ceylonese Rainforest	4.17.13	Laccadives Islands
4.3.1	Bengalian Rainforest	4.18.13	Maldives & Chagos Islands
4.4.1	Burman Rainforest	4.19.13	Cocos-Keeling & Christmas Islands
4.5.1	Indochinese Rainforest	4.20.13	Andaman & Nicobar Islands
4.6.1	South Chinese Rainforest	4.21.13	Sumatra
4.7.1	Malayan Rainforest	4.22.13	Java
4.8.4	Indus-Ganges Monsoon Forest	4.23.13	Lesser Sunda Islands
4.9.4	Burma Monsoon Forest	4.24.13	Celebes
4.10.4	Thailandian Monsoon Forest	4.25.13	Borneo
4.11.4	Mahanadian	4.26.13	Philippines
4.12.4	Coromandel	4.27.13	Taiwan
4.13.4	Ceylonese Monsoon Forest		
4.14.4	Deccan Thorn Forest		
4.15.7	Thar Desert		

Biome Types

[▤]	1	Tropical humid forests
[▥]	4	Tropical dry or deciduous forests (incl. monsoon forests) or woodlands
[▦]	7	Warm deserts and semideserts
[ ]	13	Mixed island systems

KAILASH SANKHALA
I.F.S. (Retd.)

21, Dhuleshwar Garden,
Jaipur 302008

Nov. 16, 1987

Dear Dr. Mishra,

Congratulations for reshaping the Cheetal ! The cover page still needs better designing. The type face of letters continues to be old. This also need a change. Even 'Zoo Print' has better type face and smooth printing.

The purpose of my letter is still different : 'Sloppy Management' .

I have read with interest V.B. Singh's article 'Professionalism in Wildlife Management' in the recent issue of 'Cheetal'. Shri Singh is an old guard of wildlife in India. Certainly, he is competent to comment on the past and suggest for the future. He is an exception among the forest officers in the country who stayed in wildlife organisation throughout and his concern continues even after retirement from the service. He is right that the wildlife has been dealt with by the Forest Deptt. too casually. This has failed to develop any professionalism in the cadres both non-officer and officer. But, Mr. Singh has held back vital information of his experience. When he mentions that 9 Chief Wildlife wardens changed in 6 years, he did not say that quite a few had no experience of wildlife management even for a day and came on their succession stop over for promotion. The post was used more for cadre adjustment by the Deptt.

The story of lower cadre is different. They were posted not because they were qualified and competent, but largely for other considerations including punishments. They were mostly dejected or rejected officers and men. I may be excused for too generalised a statement. There are exceptions. These are microscopic in number. Shri Singh has also held back the vital information as to why the wildlife cadres do not attract officers and men. His statistics on page 34 & 35 of his article therefore, are of not much relevance. It is only the effect and not the cause. The fact is how many Police Officers would like to work in the Reserve Lines ? Wildlife is worst than a reserve line, if it happens to be a posting out of way to a place like Desert of Jaiselmer or Goshaba of Sunderbans. Facing similar situation, we in Rajasthan (I was Chief Wildlife Warden then) circulated a letter to all the Range officers and Dy. Rangers if they would like to opt for wildlife. Out of over 800, only two opted. They too got the Minister's desire to jump back. One should not expect much out of the forest service where there is an alternate and better choice. Even those recruited on exclusive wildlife posts got their

name in 'Minister's desire' list of posting outside the wildlife organisation. Those posted from the Forest Department stayed only till it was convenient to them. One of the toppers of the Wildlife Management Institute, basically a Forester, behaved no better. Therefore, I think, the answer is not a sub-cadre but a separate cadre and thereafter, all what Shri Singh has suggested as incentives. But, till the sluice valve opens both ways, the free flow will continue as per levels. In this case, conveniences and not the commitments, are the level. Till you leave an opportunity to escape, the present situation would continue.

Our pious thinking that officers and men should develop dedication and love for nature. Forget about it ! In a contemporary society, every one wants to be as comfortable as the other, send his children to the best school, drive a new car and live in a good house. Only mad caps like me and few exceptions will stay.

We have broken from the tradition of giving importance to aptitude environment of the background at the time of recruitment to the service. We look for mark-sheet, good scores of english and mathematics and not for the mad love for outdoors. The boy who has not spent a single night in the jungle in 24 years of his formatic life, how do you think, he will shape a good out-door man. Loving forest and wildlife is not loving human beings. Who would love to be lost in the wild ? Our basic thinking is wrong. We take grass to manufacture steel ! Unless recruitment is based on aptitude and proven merit for outdoors, nothing much will be achieved.

Kindly refer to your esteemed journal's back numbers vol. 'Wing the wildlife wing'. I have some more to add. Better example of fairly a successful organisation is not UP, as already admitted by Shri Singh on page 34 & 35. The princely states of Rajasthan had a shikar departments and they accomplished more than what U.P's wildlife department did, i.e. protection and shikar arrangements of V.I.P's. Col. Kesari Singh, the legend of Jaipur and Dhabhai Tulsinath Singh of Udaipur both have been celebrated wildlifers and authors, though none of them had any creditable University degree. Since 1974 (in 13 years) there have been only two individuals who had the charge of Chief Wildlife Warden and the third one has just joined. The post was never vacant. Here Dy. Chief Wildlife Wardens are for last 27 years and more. Almost every one has been outstanding in the field. The initial recruitment was in wildlife organisation and they had cast their dye at that time for ever. They were moulded and trained. Fateh Singh Rathore is one. He is a highly decorated wildlifer. The department did not face any difficulty since adequate care was taken for their carrier progress. Those recruited as Wardens or Rangers had opportunity to rise up to Additional Chief Wildlife Wardens. They had no opportunity to escape. But those who came from

forest Department, on next man for promotion, did not stay long. We have two exceptions. The wildlife wing is with full flight fathers since it is not under the Forest Deptt. but, it is with the Forest Department.

Shri Singh has been mild in developing his theory. He has not suggested that no one should be Chief Wildlife Warden unless he has been a regular Warden or Field Director for five years.

Shri Singh has not been fair to Chief Wildlife Wardens. The highest post of the Director, Wildlife, India which holds the responsibilities of the wildlife protection Act, 1972 and directs the policy of the Govt. of India does not need any experience of working as Chief Wildlife Warden. The post does not belong to wildlife or I.F.S. cadre. It is held in addition to duties by a Joint Secretary of the Ministry. Is there no full time work for the Director to justify his independent existence even after 15 years ? If it is so, then there is no justification for Chief Wildlife Warden. Let that be also held in addition. The framers of the law—our Parliamentarians did not think that way and there is no such exception in the law. How can one expect a person to function properly who has no experience or training of wildlife management. It is interesting that no Chief Wildlife Warden, even senior in service, can be considered for the post of Director, Wildlife. A Chief Wildlife Warden can become Inspector General of Forests and Additional Secretary, but he is not eligible to become Director, Wildlife, India, in Jt. Secretary pay scale. A strange situation ! With all experience, dedication, hard work, distinctions, merits and training, a Chief Wildlife Warden is unfit to become Director, Wildlife. The post appears to be a reserve constituency for a different caste or tribe ! What incentive does this situation provide to the Chief Wildlife Wardens ? None ! And Shri Singh has not commented.

I wrote to our beloved Prime Minister about this derogatory position when he was holding the portfolio. It was sent for comments to the Deptt. of Wildlife and Forests. I have received no communication. I am told, it is pending where it should not have gone. The cadre continues to be truncated.

Shri Singh also forgot to mention about other encouragements like wildlife merit awards and incentives. The Government of India, Deptt. of Environment has instituted National Awards like 'Vraksh Mitra' and have given to those working for tree plantations and tree preservation. But in case of wildlife, there is no such award. The one instituted by the Indian Wildlife Board was probably for Dr. Salim Ali, way back in 1982. I think we are waiting for Dr. Salim Ali to be reborn to merit the second award ! This is not the place to drop names. I do not think the situation is that bad. Search—you will find, if they are not dead.

There are quite a few awards of Institutions and other Governments. They are given to Indian citizens also. What use are these foreign awards when your own country does not recognize your merit ? Remember, these awards are not without price. Sometimes, they are dangerously connected and receipts of which should have Govt. of India's clearance.

Think and judge, where does wildlife management stand ! Is it worth joining an organisation which has not shaped in last three decades. It needs a careful consideration and a research in depth. I would advise the Wildlife Institute of India to hold seminar for an open debate.

Now, we should not think in the narrow perspective of wildlife. We should consider Nature conservation and include all forests which need protection and where no forestry operations are conducted and likely to be conducted in the next few decades. Thanks to the Forest Departments, there are many such areas where there is nothing to fell. It would provide wider base and viability to the new organisation. It should be a Department of nature con-servation and personnels recruited and posted cast their mold once and for ever.

Yours sincerely
(KAILASH SANKHALA)

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Gandhiji and Wild Life

If our sense of right and wrong had not become blunt, we would recognise that animals had right, no less than men. This education of the heart is the proper function of humanitarian leagues. I know that the lower creation groans under the arrogant lordship of man. He counts no cruelty too repulsive when he wants to satisfy his appetite, whether lawful or unlawful.

If the beasts had intelligent speech at their command, they would state a case against man that would stagger humanity. I can understand the shooting of wild beasts which come to annoy us. But I have found no cogent reasons advanced for wasting money upon organising parties for satisfying man's thirst for blood.

I do believe that all God's creatures have the right to live as much as we have. Instead of prescribing the killing of the so-called injurious fellow-creatures of ours as a duty, if men of knowledge had devoted their gift to discovering ways of dealing with them otherwise than by killing them, we would be living in a world befitting our status as men-animals endowed with reason and the power of choosing between good and evil, right and wrong, violence and non-violence, truth and untruth. I prefer to be called a coward or a fool or worse, to denying, for the sake of being considered a wise man, what I believe to be a fundamental truth of life.

I am not opposed to the progress of science as such. On the contrary, the scientific spirit of the West commands my admiration and if that admiration is qualified, it is because the scientist of the West takes no note of God's lower creation. I abhor vivisection with my whole soul. I detest the unpardonable slaughter of innocent life in the name of science and humanity so-called and all the scientific discoveries stained with innocent blood I count as of no consequence. If the circulation of blood theory could not have been discovered without vivisection, the human kind could well have done without it. And I see the day clearly drawing near when the honest scientist of the West will put limitations upon the present methods of pursuing knowledge.

It is an arrogant assumption to say that human beings are lords and masters of the lower creation. On the contrary, being endowed with greater things in life, they are trustees of the lower animal kingdom.

(*Wit and Wisdom of Mahatma Gandhi*

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On A Rare Sighting Of Western Tragopan (*Tragopan melanocephalus*) In District Chamba, Himachal Pradesh, India

By

P. C. Tak

Zoological Survey of India, Dehra Dun

The Western Tragopan *(Tragopan melanocephalus)* once not uncommon is, presently, the rarest West Himalayan Pheasant. Recently it has been accorded endangered status by the I.U.C.N. (King, 1981). This species is found only in the temperate and sub-alpine forest zones (1800-3000 m) of Pakistan and India, the eastern limits of its distribution being somewhere in Tehri-Garhwal, western Uttar Pradesh (Ali and Ripley 1969, Gaston *et al.* 1981 a, b), and within these limits it occupies a limited variety of vegetation types such as: dense forests of spruce (*Picea smythiana*) and silver fir (*Abies pindrow*) with a well developed understorey of rue and ringal bamboo (*Arundinaria fulcata*), the area of which is steadily decreasing (Gaston *et al.* 1983).

As relatively little information was available on the status of the species until 1978, the need for undertaking field surveys to determine its current status and distribution was felt by all ornithologists. Consequently a number of field surveys were conducted simultaneously by various workers with a relatively broad spectrum of surveying and/or censusing pheasants in different pockets of the species' range, e.g. : In Pakistan by Mirza *et al.* (1978), Mirza (1981) and Islam (1981) ; In Kashmir by Lamba *et al.* (1987); In Himachal Pradesh, in the upper Beas River Catchment area, by Gaston *et al.* (1981 a, b and 1983).

Obviously with this point in view and on the request of the Chief Wildlife Warden, Himachal Pradesh, the Director, Zoological Survey of India deputed the author along with Dr. M. L. Narang of the ZSI, Solan to locate Western Tragopan in Chamba district of Himachal Pradesh in September 1987. They were actively associated by Mr. R. Paliwal of the ZSI, Solan, Mr. P. Thapliyal, DFO, WL, Chamba and Mr. S.K. Gularia, RO, WL, Mandi, H.P.

In all, the following three localities, viz., Kugti, Saho-Sara and Kalatop-Khajjiyar where the pheasant was expected to be found, were surveyed.

Name of locality	Status	Area (approx.)	Lat. (N) × Long.(E) (approx.)	Altitudinal range explored
Kugti *ca* 80 km SE of Chamba	Sanctuary	100 km²	32.29 × 76.40	2450–3500 m
Saho-Sara *ca* 30 km NE of Chamba	Reserve Forest	20 km²	32.40 × 76.15	2425–3100 m
Kalatop-Khajjiyar *ca* 25 km W of Chamba	Sanctuary	19 km²	32.35 × 75.58	2000–2400 m

(Please see map also)

The field work commenced on 13th Sept. and culminated on 25th Sept., 1987. A total of 74 party-hrs were spent in exploration. The altitudinal range explored varied from 2000 m to 3500m. On reaching in the species' habitat, the party was divided into 2 teams. The teams then surveyed the different valleys with the help of local guides. Services of one local dog were also utilized in Saho-Sara area.

On 19th September 1987 at 1445 hrs one team composed of the author, R. Paliwal and S K. Gularia had the fortune to flush a group/family party (1 male, 1 female and 3 young ones) of the Western Tragopan at 2850 m on a thickly forested NW facing slope of about 60° above Saredi Khad in Ainpukhri block of the Saho-Sara Reserve Forest. The habitat composition, in terms of the percentage, of the slope as inspected visually turned out to be: Tree canopy (70-80%), Middle storey (50-60%) and Ground cover (75-85%). In this locality several indirect evidences such as: Calls, Feathers, Droppings, and Local enquiries etc. were also recorded by the party. Besides Western Tragopan, the other pheasants sighted, heard and flushed in the areas surveyed were: Monal (*Lophophorus impejanus*) and Koklas (*Pucrasia macrolopha*).

The foregoing observations suggest an early census of the Western Tragopan in particular and the Pheasants in general in Saho-Sara area, the findings of which may ascertain probability of the area being second stronghold of the species in Himachal Pradesh.

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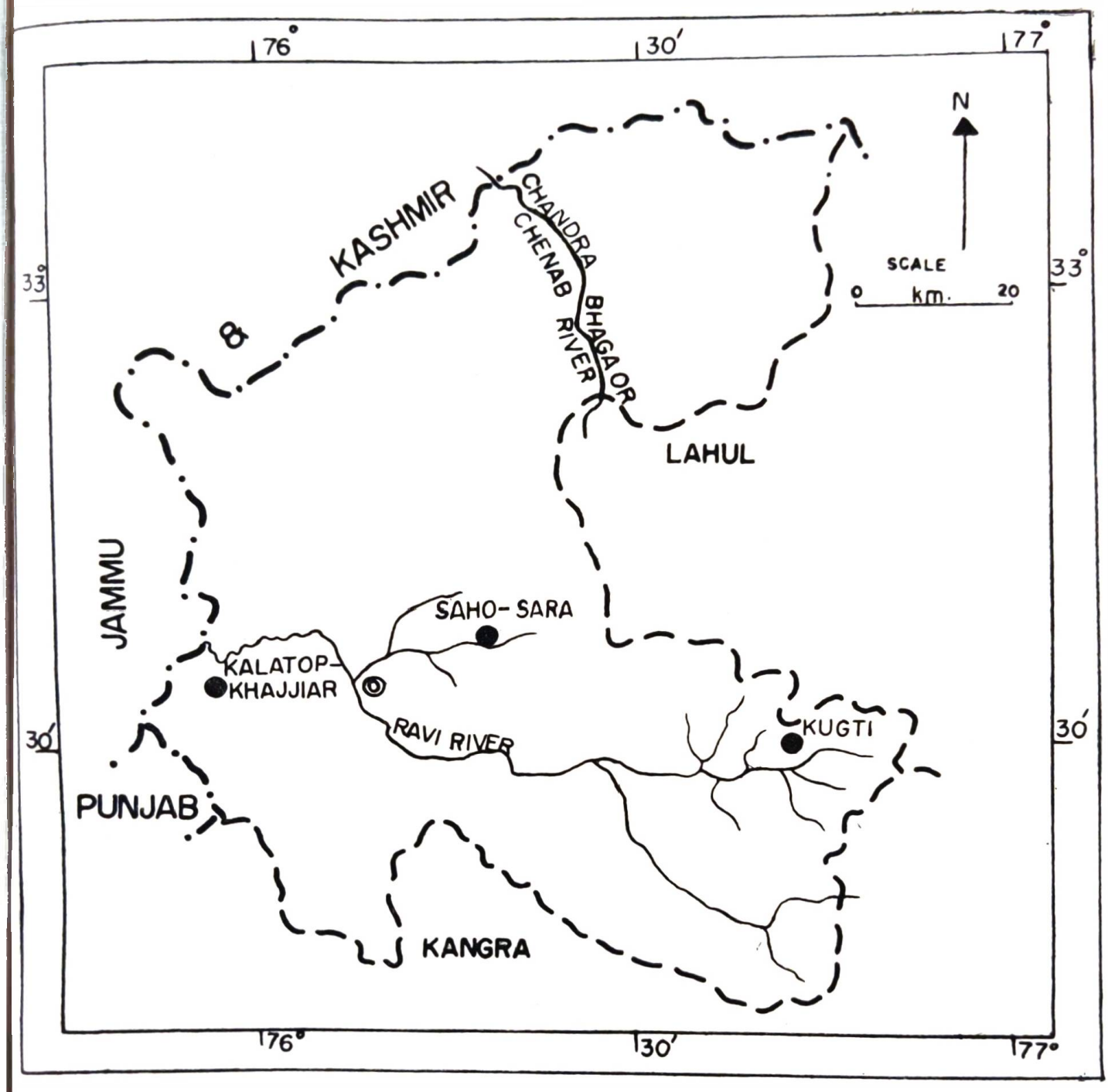

MAP OF DISTRICT CHAMBA (HIMACHAL PRADESH)- SHOWING THE LOCALITIES SURVEYED IN SEPTEMBER 1987 FOR WESTERN TRAGOPAN (TRAGOPAN MELANOCEPHALUS)

(For reference see Article 'Trout Fishing....., on Page 27)

Uttar Pradesh's
GRAND ATTRACTION

For Lovers of Wild Life
CORBETT NATIONAL PARK
DUDWA NATIONAL PARK
VALLEY OF FLOWERS NATIONAL PARK

CORBETT NATIONAL PARK is famous all over the world for its scenic grandeur and its wildlife—elephants, tigers, deer (several species) and a host of other mammals, birds and reptiles—the Ghariyal and magar and the mighty "Mahasheer fish".

DUDWA NATIONAL PARK is famous for its biggest surviving herd of 2600 swamp deer besides Tiger, Spotted deer, Sambhar, Hogdeer, Barking deer, Sloth bear, Wild boar, Marsh Crocodile and hundreds of innumerable birds. It is also now a home of Great Indian One Horned Rhinoceros introduced recently.

VALLEY OF FLOWERS NATIONAL PARK is an alpine valley nestling in shadow of snow peaks full of lush vegetation during monsoon. The valley remains in bloom for three months. The important vegetation consists of Rhodendrons, Primulas, Potentillas, Saxifrages, Marigold etc.

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FORM IV

(See Rule 8)

1.	Place of Publication	...	7, Astley Hall, Dehra Dun
2.	Periodicity of its Publication	...	Quarterly
3.	Printer's Name	...	Shri T.C. Sharma
	Nationality	...	Indian
	Address	...	Dun Printing House, 27, Rajpur Road, Dehra Dun
4.	Publisher's Name	...	Dr. R.N. Misra
	Nationality	...	Indian
	Address	...	Wildlife Preservation Society of India,
5.	Editor's Name	...	Dr. R.N. Misra
	Nationality	...	Indian
	Address	...	7, Astley Hall, Dehra Dun
6.	Name of the Printing Press and the true and precise description of the premises.	...	Wildlife Preservation Society of India, 7, Astley Hall, Dehra Dun.
7.	Names and addresses of individuals who own the newspaper and partners or shareholders holding more than one per cent of the total capital.	...	Dun Printing House, 27, Rajpur Road, Dehra Dun The Wildife Preservation Society of India, 7. Astley Hall, Dehra Dun

I, Dr. R.N. Misra, hereby declare that the particulars given above are true and correct to the best of my knowledge and belief.

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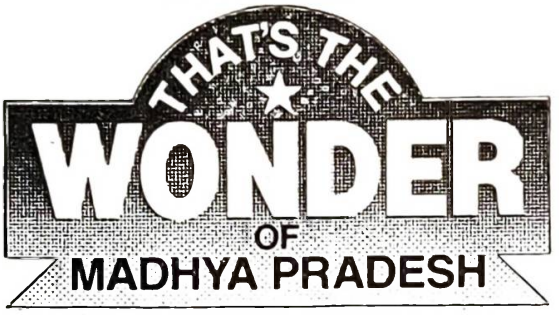

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Edited by Dr. R.N. Misra, Dr. S.K. Sangal, N.K. Jain and Published by Dr. R.N. Misra, Hony. Secretary Wildlife Preservation Society of India (Phone: 25392), 7, Astley Hall, Dehra Dun and Printed by T.C. Sharma at Dun Printing House, Rajpur Road, Dehra Dun.

Published on 4/1/88